

35 U.S.C. § 112

The Examiner states that "[c]laims 1-53 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention."

Item A

The Examiner states that "[c]laims 1-25, 45-53 are indefinite because the claims do not recite a positive process step which clearly relates back to the preamble. The preamble states that the method is for 'characterizing' DNA but the final process step is purifying DNA. Therefore, the claims are unclear as to whether the method is a method of characterizing DNA or purifying DNA."

It is respectfully pointed out to the Examiner that the process for characterizing DNA claimed in the preamble comprises a primary step of isolating nucleic acids, which in turn is comprised of a number of steps of which purifying DNA is just one of the steps. Thus, the invention is a method that characterizes DNA of which purifying the DNA is but one step.

Item B

The Examiner states that "[c]laims 1-25 and 45-53 are also indefinite over the recitation in line 1 of claims 1 and 2 of 'the step' because this term lacks antecedent basis. This rejection can be overcome by amending to a 'step.'"

The amendment to Claim 1 removes the basis for this rejection.

Item C

The Examiner states that "as written it is unclear whether the heating occurs after step (a) for the purpose of lysis or after step (c) to achieve release of the DNA from the solid support. Additionally, Claims 4 and 44 are indefinite over the recitation of 'the further step of heating' because 'the further step of heating' lacks antecedent basis."

It is respectfully pointed out to the Examiner that the steps as described in claim 1 are not listed in order of performance. Thus, the further step of heating the solid support is recited as a modification to claims 1 and 2. Furthermore, because the recitations of claim 4 and 44 lack antecedent basis they are listed as a "further step" to modify claim 1 and 2.

Item D

The amendments to the claims remove the basis for this rejection.

Item E

It is respectfully pointed out to the Examiner that because the recitations of claim 11 and 13 lack antecedent basis they are listed as a "further step" to modify claims 1 and 2.

Item F

It is respectfully pointed out to the Examiner that because the recitations of claim 12 and 14 lack antecedent basis they are listed as a "further step" to modify claims 1, 2, and 12.

Item G

It is respectfully pointed out to the Examiner that because the recitations of claim 13 and 14 lack antecedent basis they are listed as a "further step" to modify claims 11 and 12.

Item H

It is respectfully pointed out to the Examiner that because the recitations of claim 15 and 47 lack antecedent basis they are listed as a "further step" to modify claims 1, 2, 26, 27, and 45.

Item I

It is respectfully pointed out to the Examiner that because the recitations of claim 16 and 13 lack antecedent basis they are listed as a "further step" to modify claims 1 and 2.

Item J

It is respectfully pointed out to the Examiner that because the recitations of claims 17-23 and 48-53 lack antecedent basis they are listed as a "further step" to modify claims 1, 2, 26, 27, and 45.

Item K

It is respectfully pointed out to the Examiner that because the recitation of claim 18 lacks antecedent basis it is listed as a "further step" to modify claims 17.

Item L

It is respectfully pointed out to the Examiner that because the recitations of claims 19 and

49 lack antecedent basis they are listed as a "further step" to modify claims 17 and 48.

Item M

It is respectfully pointed out to the Examiner that because the recitation of claim 20 lacks antecedent basis it is listed as a "further step" to modify claim 17.

Item N

It is respectfully pointed out to the Examiner that because the recitations of claims 21 and 50 lack antecedent basis they are listed as a "further step" to modify claims 17 and 48.

Item O

It is respectfully pointed out to the Examiner that because the recitations of claims 22 and 52 lack antecedent basis they are listed as a "further step" to modify claims 17 and 48.

Item P

It is respectfully pointed out to the Examiner that because the recitations of claims 23 and 53 lack antecedent basis they are listed as a "further step" to modify claims 17 and 48.

Item Q

The amendments to the claims remove the basis for this rejection.

Item R

The amendments to the claims remove the basis for this rejection.

Item S

The amendments to the claims remove the basis for this rejection.

Item T

The amendments to the claims remove the basis for this rejection.

Item U

The amendments to the claims remove the basis for this rejection.

Item V

It is respectfully pointed out to the Examiner that because the recitation of claim 51 lacks antecedent basis it is listed as a "further step" to modify claim 48.

**35 U.S.C. § 102**

Item 8

The Examiner states that "[c]laims 1-3, 5-6, 8, 11-21, 23-30, 32-33, 37, 39, 41, 45-51, and 53 are rejected under 35 U.S.C. 102(b) as being anticipated by Boom et al (5,234,809)."

It is respectfully pointed out to the Examiner that the invention in Boom recites a method in which the nucleic acid-containing starting material, a chaotropic substance, and a nucleic acid binding phase are mixed together to form a particulate suspension. The chaotropic substances listed in Boom are harsh substances that disrupt hydrophobic structures, and bear a structural similarity to the protein structures they disrupt. As recited in Boom, the chaotropic substance is at least one substance selected from the group consisting of a guanidinium salt, sodium iodide,

potassium iodide, sodium thiocyanate and urea. The current invention does not recite the use of any of the chaotropic substances claimed in Boom. Moreover, the current invention does not recite the use of any chaotropic materials.

On the other hand, the current invention recites the use of a lysing reagent which is composed of an amount of a detergent effective to lyse cells or protein coats sufficiently to release DNA; water; and optionally, a chelating agent to reduce DNA damage, and a buffer effective to provide a pH of greater than about 2. The detergent is preferably anionic. Examples of anionic detergents include N-lauroyl sarcosine or a dodecylsulfate salt, where sodium dodecylsulfate is a particularly preferred anionic detergent. These reagents are not chaotropic reagents. Similarly, Boom does not recite the use of a lysis reagent as recited in the present invention.

Additionally, Boom teaches that the Gu-SCN is added to the vessel containing the solid support prior to the addition of the biological material. In Boom, the chaotropic substance is added in excess to the vessel containing the solid support such that the biological material contacts the chaotropic substance present in excess first, but not such that the biological material contacts the solid support or the lysing reagent bound to the solid support as in the present invention. Specifically, the Gu-SCN is added in excess to the vessel containing the solid support (the silica beads) to create a particulate suspension of the silica beads in the Gu-SCN. Thus, the biological material is solubilized and the DNA released by the Gu-SCN molecules in solution.

On the other hand, the current invention recites the use of a solid support to which the lysing reagent is added, and the excess lysis reagent removed. Thus, the lysis reagent is bound

to the solid support to create a lysing matrix. In a preferred embodiment, the solid support to which the lysis reagent is added is then dried. Thus, this binding interaction between the lysing reagent and the solid support cannot be a transient one in the sense described by the Examiner because the lysis reagent must be bound to the solid support at the time that the biological material contacts the solid support. When the biological material contacts the solid support, the cell and nuclear membranes of the biological material solubilize and/or rupture, thereby releasing the DNA which then binds to the solid support. Thus, the molecular interactions that result between the biological material, solid support and lysis reagent in the current invention are fundamentally different from those seen in Boom. Therefore, the current invention is novel over Boom.

Furthermore, the limitations recited by the dependent claims 3, 5-6, 12-17, 18, 19, 21, 23, 28, 29-30, 32, 47-49, 50, 53 are not taught by Boom because the claims they are dependent on (Claims 1 & 2) claim a different invention than that in Boom as described in the aforementioned discussion.

#### Item 9

The Examiner states that "[c]laims 1-20, 24-33, 37-41, and 44-49 are rejected under 35 U.S.C. § 102(b) as being anticipated by Deggerdal (WO 96/18731)."

It is respectfully pointed out to the Examiner that Claim 1 of the Deggerdal patent application (WO 96/18731) recites "a method of isolating nucleic acid from a sample, said method comprising contacting said sample with a detergent and a solid support . . ." Deggerdal does not teach pre-treating the solid support with a lysing reagent prior to contacting it with the

biological material. On the other hand, the current invention teaches contacting a biological material with a solid support to which a lysing reagent has been added prior to the addition of the biological material.

Furthermore, the limitations recited by the dependent claims 4, 5-7, 8-10, 11, 29-31, 33, 37-41, and 44 are not taught by Deggerdal because the claims they are dependent on (Claims 1 & 2) claim a different invention than that in Deggerdal as described in the aforementioned discussion.

**35 U.S.C. § 103**

**Item 11**

It is respectfully pointed out to the Examiner that all claims describe inventions by both listed inventors.

**Item 12**

The Examiner states that "[c]laims 38 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boom (5,234,809) in view of Deggerdal (WO 96/18731)."

Although Boom teaches that the Gu-SCN is added to the vessel containing the solid support prior to the addition of the biological material, Boom's invention is fundamentally different from the current invention. In Boom, the Gu-SCN is added in excess to the vessel containing the solid support (the silica beads) to create a particulate suspension of the silica beads in the Gu-SCN. Thus, the biological material is solubilized and the DNA released by the Gu-SCN molecules in suspension. On the other hand, the current invention recites the use of a

solid support to which the lysing reagent is added, and the excess lysis reagent removed. In a preferred embodiment, the solid support to which the lysis reagent has been added is then dried. Contact with the solid support causes the cell and nuclear membranes of the biological material to solubilize and/or rupture, thereby releasing the DNA which then binds to the solid support. Thus, the molecular interactions that result between the biological material, solid support and lysis reagent in the current invention are fundamentally different from those seen in Boom. Thus, the current invention is novel over Boom.

It is respectfully pointed out to the Examiner that the Deggerdal patent application (WO 96/18731) recites "a method of isolating nucleic acid from a sample, said method comprising contacting said sample with a detergent and a solid support . . ." Deggerdal does not teach treating the solid support with a lysing reagent prior to contacting it with the biological material. On the other hand, the current invention teaches contacting the lysing reagent with the solid support, and then contacting the biological material to the solid support to which the lysing reagent has been added.

Thus, it would not have been prima facie obvious to one of ordinary skill at the time of the invention to pre-treat the solid support with a lysing reagent such as SDS prior to contacting it with a biological material, which is the novel and non-obvious step of the current invention.

#### Item 13

The Examiner states that "[c]laims 23 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Deggerdal (WO 96/18731) in view of Boom (5,234,809)."

The aforementioned discussions detailing the differences between the current invention

and the inventions of Boom and Deggerdal overcome this rejection cited by the Examiner.

Item 14

The Examiner states that "[c]laims 7, 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boom (5,234,809) in view of Su (5,804,684)."

The aforementioned discussions detailing the differences between the current invention and the invention of Boom overcome this rejection cited by the Examiner. Claims 7 and 31 are dependent on claims 1 & 2, and claims 26 & 27 respectively that are shown in the aforementioned discussions to be novel and non-obvious over the claims in Boom.

Item 15

The Examiner states that "[c]laims 42-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boom (5,234,809) or Deggerdal (WO 96/18731) in view of Su (5,804,684)."

The aforementioned discussions detailing the differences between the current invention and the inventions of Boom and Deggerdal overcome this rejection cited by the Examiner.

Item 16

The Examiner states that "[c]laims 22 and 51-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boom (5,234,809) or Deggerdal (WO 96/18731) in view of Sambrook (Molecular Cloning)."

The aforementioned discussions detailing the differences between the current invention and the inventions of Boom and Deggerdal overcome this rejection cited by the Examiner.

Item 17

The Examiner states that "[c]laims 33 and 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boom (5,234,809) or Deggerdal (WO 96/18731) in view of Arnold (5,559,667)."

The aforementioned discussions detailing the differences between the current invention and the inventions of Boom and Deggerdal overcome this rejection cited by the Examiner.

Furthermore, the solid supports of Arnold are not the solid supports of the current invention. Applicant notes that in the method taught by Arnold, the covalently bound detergent molecules are not bound to the solid support before the biological material is added to the solid support. In Arnold, the contacting solution is added to the solid support no earlier than at the time of the addition of the biological sample. The contacting solution is designed to wash the nucleic acids after they are already bound to the solid support. Although the resulting solid support of Arnold may contain detergent and biological sample, it is not the solid support of the current invention to which the detergent is bound prior to the addition of the biological material. Moreover, the fact that Arnold teaches a polycationic support matrix which includes inorganic and organic materials which include glasses, polyolefins and polysaccharides does not make the current invention obvious.

Claim 18

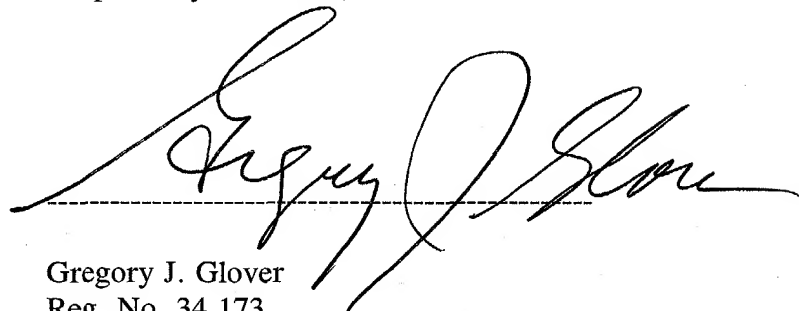
The Examiner states that "[c]laim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boom (5,234,809) or Deggerdal (WO 96/18731) in view of Arnold (5,559,667) as applied to claim 33, 35-36 above, and further in view of Hasebe (5,151,345)."

The aforementioned discussions detailing the differences between the current invention and the inventions of Boom and Deggerdal overcome this rejection cited by the Examiner.

Based on the amendments and remarks above, applicants believe that all pending claims are in condition for allowance.

If the Examiner believes that a conference would be of value in expediting the prosecution of this application, the Examiner is hereby invited to telephone undersigned counsel to arrange for such a conference.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Gregory J. Glover", is written over a horizontal dashed line.

Dated: January 14, 2000

Gregory J. Glover  
Reg. No. 34,173  
ROPES & GRAY  
One Franklin Square  
1301 K Street, N.W.  
Suite 800 East  
Washington DC 20005-3333